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**CORRECTIVE ACTION PROGRAM  
2011 ANNUAL REPORT/UPDATE  
PERMIT DEP/HWM-043-061**

**United Technologies Corporation  
Pratt & Whitney Division  
East Hartford, Connecticut**

**January 2012**

**Volume 1 of 3**

**Prepared for**

**UNITED TECHNOLOGIES CORPORATION  
PRATT & WHITNEY DIVISION  
400 Main Street  
East Hartford, Connecticut 06108**

**Prepared by**

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*An Employee Owned Company*

**LEA Comm. No. 88UT716**

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Pratt & Whitney  
400 Main Street  
East Hartford, CT 06108



**Pratt & Whitney**  
A United Technologies Company

January 26, 2012

**State of Connecticut**  
**Department of Energy and Environmental Protection**  
**Bureau of Materials Management & Compliance Assurance**  
79 Elm Street  
Hartford, Connecticut 06106-5127

Attn: Carmen Holzman

**RE: 2011 Corrective Action Annual Report**  
**United Technologies Corporation/Pratt & Whitney Division**  
**400 Main Street, East Hartford, Connecticut**  
**Permit DEP/HWM-043-061**

*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

Sincerely,

**UNITED TECHNOLOGIES CORPORATION**  
**PRATT & WHITNEY DIVISION**

  
L. Renée Welsh

Director, EHS & Facilities – MC&O

Attachment

cc: Robert Isner, CT Department of Energy and Environmental Protection (w/o attachment)  
Diane Duva, CT Department of Energy and Environmental Protection (w/o attachment)  
Maurice Hamel, CT Department of Energy and Environmental Protection  
Gil Richards, CT Department of Energy and Environmental Protection (w/o attachment)  
Lauren Levine, United Technologies Corporation  
Terry Robinson, Pratt & Whitney  
Bill Chudzik, Pratt & Whitney  
Brian Cutler, Loureiro Engineering Associates



Loureiro Engineering Associates, Inc.

January 26, 2012

**State of Connecticut  
Department of Energy and Environmental Protection  
Bureau of Materials Management & Compliance Assurance  
79 Elm Street  
Hartford, Connecticut 06106-5127**

Attn: Carmen Holzman

**RE: 2011 Corrective Action Annual Report  
United Technologies Corporation/Pratt & Whitney Division  
400 Main Street, East Hartford, Connecticut  
Permit DEP/HWM-043-061**

Dear Ms. Holzman:

On behalf of our client, United Technologies Corporation (UTC)/Pratt & Whitney Division, we have prepared this letter and attached annual report to provide the Connecticut Department of Energy and Environmental Protection (CTDEEP) with the status of activities being undertaken to comply with the requirements of Section IV, Part N of the above referenced permit. Specifically, this letter provides a status of those investigation and remediation activities associated with releases of hazardous waste and hazardous substances at or from the 400 Main Street, East Hartford, Connecticut facility. The annual report has been formatted to provide an update:

- On the 2011 program level projects;
- On the 2011 investigation activities;
- On the 2011 mitigation and remediation activities;
- On the 2011 maintenance and monitoring activities; and
- On the cost estimate for planned investigation and remediation activities and operation and maintenance of those remediation systems presently in place.

As you are aware, permit No. DEP/HWM-043-061) was issued to the facility on September 29, 2005. The first task required by the permit was the preparation and submission of an Environmental Condition Assessment Form (ECAAF). The ECAAF was submitted to the CTDEEP on February 24, 2006. As of the date of this report, the CTDEEP has not notified UTC/Pratt & Whitney Division if CTDEEP will oversee the remaining investigation/remediation activities or whether Loureiro Engineering Associates, Inc., as a Licensed Environmental Professional (LEP) may verify that all known releases of hazardous waste or hazardous substances at the facility have been investigated and remediated in accordance with the Remediation Standard Regulations (RSRs). We trust that the information contained herein meets with your satisfaction. Should you have any questions or comments, please do not hesitate to contact Lauren Levine of UTC at (860) 728-6520 or me at (860) 410-2968.

State of Connecticut  
January 26, 2012  
Page 2 of 2



Sincerely,

**LOUREIRO ENGINEERING ASSOCIATES, INC.**

A handwritten signature in dark ink, appearing to read 'B. Cutler', is written over a horizontal line.

Brian A. Cutler, P.E., L.E.P.  
President

Attachment

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- Appendix B 2011 Annual Post Remediation Maintenance and Groundwater Monitoring Report F & H Building East Hartford, Connecticut (Volume 3 of 3)
- Appendix C Cost Estimate for Corrective Action Activities



## ACRONYMS

AST	Aboveground Storage Tank
CTC	Customer Training Center
CTDEEP	Connecticut Department of Energy and Environmental Protection
CT ETPH	Connecticut Extractable Total Petroleum Hydrocarbons
DNAPL	Dense Non-Aqueous Phase Liquid
DSN	Discharge Serial Number
ECAF	Environmental Condition Assessment Form
ELUR	Environmental Land Use Restriction
ETAL	Experimental Test Airport Laboratory
GAC	Granular Activated Carbon
GB PMC	GB Pollutant Mobility Criteria
GWTS	Groundwater Treatment System
HCS	Hydraulic Control System
HWM	Hazardous Waste Management
IDEC	Industrial/Commercial Direct Exposure Criteria
LEA	Loureiro Engineering Associates, Inc.
LEP	Licensed Environmental Professional
LNAPL	Light Non-Aqueous Phase Liquid
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OPM	Office of Policy and Management
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PRA	Potential Release Area
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RCP	Reasonable Confidence Protocol
RCRA	Resource Conservation and Recovery Act
RCSA	Regulations of Connecticut State Agencies
RSRs	Connecticut Remediation Standard Regulations
SPDES	State Pollutant Discharge Elimination System
SSVS	Sub-slab Ventilation System
SVOC	Semivolatile Organic Compounds
UTC	United Technologies Corporation
VOCs	Volatile Organic Compounds
WWTP	Wastewater Treatment Plant

## UNITS

gpm	gallons per minute
mg/kg	milligrams per kilogram

## 1. INTRODUCTION

United Technologies Corporation/Pratt & Whitney Division (UTC/Pratt & Whitney) submitted a Resource Conservation and Recovery Act (RCRA) Part B Permit Application to the regulatory agencies on September 5, 1991 for the Pratt & Whitney facility located at 400 Main Street in East Hartford, Connecticut (i.e., 400 Main Street facility). In response to the September 5, 1991 submittal and subsequent amendments, a RCRA Part B Permit to Operate a Connecticut Hazardous Waste Facility (Permit No. DEP/HWM-043-061) was issued by the Connecticut Department of Environmental Protection on September 29, 2005. As of July 1, 2011, the Connecticut Department of Environmental Protection has been renamed the Connecticut Department of Energy and Environmental Protection (CTDEEP). The permit authorizes, in the Centralized Waste Storage and Transfer Facility, the storage of hazardous wastes, non-hazardous wastes, universal wastes, and used oil generated from the design, manufacture, assembly, and testing of aircraft jet engine components and the storage and management of wastes from other UTC off-site locations. The Permit incorporates conditions requiring the implementation of a formal Corrective Action program.

Section IV, Part N of the RCRA Part B Permit requires the investigation and remediation of all hazardous waste or hazardous substances released at or on the 400 Main Street facility. The requirements for investigation and remediation are referred to herein as Corrective Action obligations. Section V of Permit No. DEP/HWM-043-061 is a Compliance Schedule associated with Corrective Action obligations for the facility. The first required task was the preparation and submission of an Environmental Condition Assessment Form (ECAF). The ECAF was submitted to the CTDEEP on February 24, 2006. The CTDEEP is currently reviewing the ECAF. Upon review of the ECAF, the CTDEEP would notify UTC/Pratt & Whitney Division whether review and approval by the CTDEEP of the remaining investigation/remediation activities will be required or whether a Licensed Environmental Professional (LEP) may verify that all known releases of hazardous waste or hazardous substances at the facility have been investigated and remediated in accordance with Sections 22a-133k of the Regulations of Connecticut State Agencies (RCSA), known as the Remediation Standard Regulations (RSRs).

### 1.1 Purpose

This annual report has been prepared to provide the CTDEEP with the status of activities being undertaken to comply with the requirements of Section IV, Part N of Permit No. DEP/HWM-043-061. Specifically, this report provides a status of those investigations, mitigation, and remediation activities associated with releases of hazardous waste and hazardous





substances at or from the UTC/Pratt & Whitney Division, 400 Main Street, East Hartford, Connecticut facility. This annual report provides an update:

- On those investigation, mitigation and remediation activities conducted during the period from December 16, 2010 through December 15, 2011 (hereinafter referred to as the reporting period);
- On monitoring and maintenance for previously completed projects; and
- Of the cost estimate for planned investigation and remediation activities and operation and maintenance of those remediation systems presently in place.

Revisions of the cost estimate will continue to be provided on an annual basis and the current estimate is included as Appendix C. Remedial Action Plans (RAPs) for future proposed remedies will be submitted to the CTDEEP in accordance with the requirements of Permit No. DEP/HWM-043-061. Detailed results and completed reports are maintained by UTC.

The investigation, mitigation and remediation activities being conducted at the Site follow consistent quality assurance/quality control (QA/QC) requirements. These requirements are summarized in a Quality Assurance Project Plan (QAPP) which has been prepared. The level of QA/QC information in the laboratory reports is consistent with the Reasonable Confidence Protocol (RCP) requirements even prior to September 1, 2007 when these requirements became effective.

## 1.2 Scope

This report applies to the investigation, mitigation, remediation, maintenance, and monitoring activities underway during the reporting period at the UTC/Pratt & Whitney Division facility located at 400 Main Street, East Hartford, Connecticut (hereinafter referred to as the "Site"). The facility encompasses approximately 769 acres of contiguous land. Pratt & Whitney initiated aircraft engine manufacturing operations in East Hartford in December 1929. Current operations are conducted in an approximate 4-million square-foot complex and include administration and management, manufacturing, testing, research and development, and ancillary services. All of these activities take place in the western portion of the 769-acre property. The Rentschler Airport and the Klondike Area occupy the eastern portion of the property. UTC/Pratt & Whitney previously used these two areas as an airport and a storage/testing area, respectively.



### 1.3 **Report Format**

The following sections of this annual report/update have been prepared to document corrective action activities and costs associated with the implementation of future Corrective Action obligations. Specifically,

- Section 2 of this report provides a summary description of the program level projects underway during the reporting period;
- Section 3 provides a summary description of investigation activities performed during the reporting period;
- Section 4 provides a description of mitigation and remediation activities performed during the reporting period;
- Section 5 provides a description of maintenance and monitoring activities associated with completed remediation projects performed during the reporting period; and
- Section 6 provides a description of the cost estimate for future Corrective Action obligations which is presented in Appendix C.



## **2. 2011 PROGRAM LEVEL PROJECTS**

Program level activities are those that relate to the entirety of the 400 Main Street facility and do not involve the performance of investigation, mitigation or remediation. During 2011, one program level project was completed, this *2011 Annual Report/Update*.

In addition, a QAPP and a Public Participation Plan have been prepared to comply with the requirements of the RCRA Part B Permit and to provide consistency between the investigation, mitigation and remediation activities performed at the Site. These documents will be finalized upon receipt of the response to the ECAF. Each project is described in greater detail below.

### **2.1 2011 Annual Report/Update**

As noted in Section 1, an ECAF was submitted to the CTDEEP on February 24, 2006 and is currently under review. Although a final response to the February 24, 2006 ECAF has not yet been received, Section IV, Part N of Permit No. DEP/HWM-043-061 contains a reference to an annual report/update regarding corrective action activities at the 400 Main Street facility. The preparation of this document which includes an overview of investigation, mitigation and remediation activities at the 400 Main Street facility is intended to satisfy the annual report/update requirement referenced in the permit.

### **2.2 Quality Assurance Project Plan**

A QAPP has been prepared for the Site to document the current QA/QC procedures being utilized during the ongoing investigation and remediation activities at the 400 Main Street facility. Section V, Paragraph 6(b)(iii) of the RCRA Part B Permit requires the preparation of a QAPP to ensure that the data are of sufficient quality to make decisions regarding the investigation and remediation at the site. The QAPP takes into account the *Laboratory Quality Assurance Quality Control Guidance - Reasonable Confidence Protocols Guidance Document* developed by the CTDEEP. The QAPP also documents the auditing program to ensure the objectives of the QAPP are being met.

### **2.3 Public Participation Plan**

A Public Participation Plan has been prepared to document the public participation procedures related to remediation activities to be conducted at the 400 Main Street facility. Section V, Paragraph 6(b)(i) of the RCRA Part B Permit requires the preparation of a Public Participation Plan to ensure the public is provided the opportunity to comment on planned remediation activities and prior to making a determination that remediation is complete.



### **3. 2011 INVESTIGATION ACTIVITIES**

This Section provides a brief summary of those subsurface characterization (investigation) activities that were performed during the reporting period. The investigation activities performed during the reporting period are described below. The general location of each area investigated during the reporting period is depicted on Figure 3-1.

#### **3.1 E Building Phase II/Phase III Investigation**

The E Building Phase II/III Subsurface Investigation was performed to assess the impact of current and historical operations in the E Building Study Area on the environmental condition of soil and groundwater within and emanating from the Study Area. Located in the northwestern portion of the Site, the E Building Study Area is approximately 4.6 acres in size and encompasses the portion of the manufacturing building that is identified as E Building. Constructed at the Site in 1939 and 1940, E Building has been actively used for the manufacture of aircraft engines and components since the time of construction.

The Phase II/III Subsurface Investigation included the collection of wood-block, concrete, soil, and groundwater samples from a total of 93 Potential Release Areas (PRAs) identified within the Study Area. The subsurface investigation resulted in the overall adequate characterization of the Study Area in the context that the limits of releases identified were confirmed through sampling and analytical testing. Investigations of the E Building Study Area are considered complete with two exceptions. Additional sampling will be required to further characterize and delineate the extent of the observed contamination attributed to EB-PCSA-1: Former Solvent Recovery Area and EB-PRA-75: Former Oil and Chemical Storage Area in a northern and western direction outside of the Study Area. This additional sampling will be performed in the future as part of the investigations of the Waste Treatment and C Building Study Areas.

Based on the results of the investigations that have been completed to date, soil remediation will be required to address exceedances of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), extractable total petroleum hydrocarbons (ETPH), polychlorinated biphenyls (PCBs), and metals detected in soil samples at concentrations above one or more of the applicable Connecticut Remediation Standard Regulations (RSR) criteria. The remediation will likely entail the use of engineered and administrative controls for addressing the majority of soil contamination in the E Building Study Area. Contaminated soil in certain isolated areas will most likely be excavated and shipped offsite for disposal.

Evidence of mobile, separate-phase light non-aqueous phase liquids (LNAPL) and dense non-aqueous phase liquids (DNAPL) was identified during the investigation of the E Building Study Area. While the extent of LNAPL is relatively limited in nature, some degree of LNAPL recovery (passive or active) will most likely be required in the future. Evidence of DNAPL was identified over a more wide-spread area in the general vicinity of the Former Solvent Recovery Area. However, the presence of mobile, separate-phase DNAPL was detected in a more localized area directly beneath the Former Solvent Recovery Area in soils directly above a clay layer, which exists beneath the majority of the Site, (if not the entire Site), and general surrounding area of the Connecticut River Basin. An apparent localized depression of the top of clay is serving to contain mobile, separate-phase DNAPL. A determination as to whether or not remediation is necessary specifically to address the removal or containment of DNAPL in accordance with the RSRs will be made in the future during the remedial design planning for the Study Area.

With regard to groundwater, administrative controls in the form of an Environmental Land Use Restriction (ELUR) will be required to address the presence of compounds in groundwater at concentrations in excess of the volatilization criteria. An ELUR will also be required to restrict the area to industrial/commercial use, and vapor mitigation controls will be required. In addition to physical remediation activities, groundwater monitoring will be necessary for the Study Area to fulfill the post-remediation requirements of the RSRs and to further characterize groundwater quality.

### **3.2 Experimental Test Study Area Phase II/Phase III Investigation**

A Phase II/Phase III subsurface investigation was performed to assess the impact of current and historical operations in the Experimental Test Study Area on soil and groundwater within and emanating from the Study Area. Approximately 5.5 acres in size, the main features of the Experimental Test Study Area are a jet engine test house (Test House B), two large fire protection aboveground storage tanks (ASTs) with an associated pump house, the South Bulk Substation, jet fuel pipelines (both above and below ground), and an outdoor storage area. A second jet engine test house (Test House A) formerly occupied the northern portion of the Study Area.

The Phase II/III Subsurface Investigation included the collection of concrete, soil, and groundwater samples from a total of 32 PRAs identified within the Study Area. The subsurface investigation resulted in the overall adequate characterization of the Study Area in the context that the limits of releases identified were confirmed through sampling and analytical testing. Investigations of the Experimental Test Study Area are considered complete with two



exceptions. Some additional sampling will be required to further characterize and delineate the extent of the chlorinated solvent contamination attributed to the D Building Study Area located to the north of the Experimental Test Study Area. In addition, the extent of soil contaminated with metals in the southwest portion of the XT-PRA-19 that extends into the J Building Study Area. This additional sampling will be performed in the future as part of the investigations of the D Building and J Building Study Areas.

Based on the results of the investigations that have been completed to date, soil remediation will be required to address exceedances of VOCs, SVOCs, ETPH, PCBs, and metals detected in soil samples at concentrations above one or more of the applicable RSRs criteria. The remediation will likely entail excavation and offsite disposal as well as the use of engineered and administrative controls for addressing the majority of soil contamination in the Experimental Test Study Area.

During the performance of the investigation, several soil samples collected from the upper two feet of soil contained VOCs (specifically tetrachloroethylene) at concentrations greater than thirty times the Industrial/Commercial Direct Exposure Criteria (IDEC). UTC was notified within seven days of determining that the significant environmental hazard existed. The identified significant environmental hazard in shallow soil was remediated within ninety days of notification. The soil remediation activities are discussed in Section 4 of this report.

With regard to groundwater, administrative controls in the form of an ELUR will be required to restrict the area to industrial/commercial use (to address exceedances of the Residential Volatilization Criteria). In addition, groundwater monitoring will be necessary for the Study Area to fulfill the post-remediation requirements of the RSRs and to further characterize groundwater quality.

### **3.3 ETAL Phase II/Phase III Investigation**

A Phase II/Phase III subsurface investigation was performed to assess the impact of current and historical operations in the Experimental Test Airport Laboratory (ETAL) Study Area on soil and groundwater within and emanating from the Study Area. The Experimental Test Airport Laboratory Study Area is located in the northwestern portion of the Site and is approximately 3,520,000 square feet or 81 acres in size. The Study Area currently encompasses the Customer Training Center (CTC) (formerly known as Experimental Hangar and United Technologies Hangar #3), the United Technologies Hangar (which includes United Technologies Hangar #1 and #2 and formerly known as United Aircraft Hangar and United Aircraft Services Hangar), the Surplus Storage Building, several employee parking lots, and land previously used for the Rentschler Airport.

The Phase II/III Subsurface Investigation included the collection of wood-block, concrete, soil, and groundwater samples from a total of 70 PRAs identified within the Study Area. The subsurface investigation resulted in the overall adequate characterization of the Study Area in the context that the limits of releases identified were confirmed through sampling and analytical testing. Investigations of the ETAL Study Area are considered complete with one exception. Additional sampling will be required to further delineate the extent of the observed contamination attributed to the placement of fill around the CTC building outside of the Study Area in a northern direction. This additional sampling will be performed in the future as part of the investigation for the United Technologies Research Center.

Based on the results of the investigations that have been completed to date, soil remediation will be required to address exceedances of VOCs, SVOCs, ETPH, PCBs, and metals detected in soil samples at concentrations above one or more of the applicable RSRs criteria. The remediation will likely entail the use of engineered and administrative controls for addressing soil contamination in the ETAL Study Area.

Evidence of mobile, separate-phase LNAPL was identified during the investigation of the ETAL Study Area. While the extent of LNAPL is relatively limited in nature, some degree of LNAPL recovery (passive or active) will most likely be required in the future. While no physical evidence of DNAPL was identified during the subsurface investigation, concentrations of chlorinated VOCs in both soil and groundwater are indicative of the presence of residual DNAPL.

During the performance of the investigation, several soil samples collected from the upper two feet of soil contained SVOCs (specifically benzo(a)pyrene) at concentrations greater than thirty times the IDEC. UTC was notified within seven days of determining that the significant environmental hazard existed. The significant environmental hazard in shallow soil initially identified in one portion of the Study Area was remediated within ninety days of notification; additional exceedances were observed within the central portion of the Study Area and formal notification was made to the CTDEEP. The soil remediation activities and notification process are discussed in Section 4 of this report.

With regard to groundwater, administrative controls in the form of an ELUR will be required to address the presence of compounds in groundwater at concentrations in excess of the volatilization criteria. An ELUR will also be required to restrict the area to industrial/commercial use and vapor mitigation controls will potentially be required. In addition to physical remediation activities, groundwater monitoring will be necessary for the Study Area

to fulfill the post-remediation requirements of the RSRs and to further characterize groundwater quality.

### **3.4 Northwest Area Groundwater/Surface Water Interaction Study**

A groundwater/surface water interaction study was completed in the northwest portion of the Site between October 2009 and March 2010 to gain a greater understanding of the effects of Willow Brook and potential other hydraulic influences on groundwater flow and contaminant transport in the northwest portion of the Site. The study activities included: 1) the installation of four piezometer/surface water stilling well clusters in Willow Brook; 2) the installation of electronic water level data loggers in each piezometer/surface water stilling well location as well as several monitoring wells located in the northwestern portion of the Site; 3) the collection of water level measurements from select small diameter groundwater monitoring wells within the study area to augment the data collected utilizing data loggers; and 4) the collection of groundwater samples from select wells within the study area. The results of this study were discussed in the 2010 Annual Report/Update. The study was continued between October 2010 and March 2011. The general conclusions from the investigation are as follows:

- The hydrology of Willow Brook prevents significant migration of VOCs beyond Willow Brook. Chlorinated VOCs are likely entering Willow Brook and being transported along the stream bed of Willow Brook, and fluctuations in aquifer conditions cause the occasional occurrence of VOCs beyond (north) of the brook.
- Chlorinated VOCs were detected in piezometers installed in close proximity (the most downgradient location to the receiving water body) to Willow Brook at concentrations exceeding the applicable Ambient Water Quality Criteria and the default numeric Surface Water Protection Criteria.
- Chlorinated VOCs were detected in shallow and deep groundwater at concentrations exceeding both the numeric Residential and Industrial/Commercial Volatilization Criteria. It should be noted that no buildings currently exist in the portion of the Site where the study was conducted.
- No exceedances of applicable regulatory criteria (i.e. the Ambient Water Quality Criteria or the Volatilization Criteria) were detected in any of the monitoring wells located beyond Willow Brook during this investigation.

Additional monitoring activities were initiated in December 2011 and will continue into the Spring of 2012 to further assess the fate and transport of groundwater impacted by VOCs in the



northwest portion of the Site. The results will be summarized in the 2012 Annual Report/Update.

### **3.5 Northwest Area Groundwater Monitoring**

Groundwater sampling continues as part of a groundwater investigation in the northwest portion of the Site. The groundwater sampling is being performed to refine the understanding of the current groundwater quality within that portion of the Site and to obtain additional data regarding groundwater hydraulic conditions beneath the facility. Data obtained during the sampling events are evaluated and recommendations are made for additional investigations as needed.

In 2011, groundwater samples were collected from select monitoring wells on a quarterly basis. A more comprehensive monitoring event was performed between late September and early October 2011. The number of groundwater monitoring wells monitored each quarter was reduced compared to 2010 based on the groundwater results as well as the performance monitoring data collected for the operation of the Groundwater Hydraulic Control and Treatment System located in the northwest portion of the Site. The Groundwater Hydraulic Control and Treatment System (which has been operational since April 2009) was installed to mitigate the migration of groundwater contaminated with hexavalent chromium beneath the northwest portion of the Site. The results of the sampling and monitoring indicate that the Groundwater Hydraulic Control and Treatment System is effectively achieving the aforementioned remediation goal as evidenced by decreasing concentrations in groundwater collected from monitoring wells located downgradient of the system.



## **4. 2011 MITIGATION AND REMEDIATION ACTIVITIES**

This section provides a summary description of mitigation and remediation activities that were performed during the 2011 reporting period. This section also includes a description of operation and maintenance activities associated with active mitigation or remediation systems.

### **4.1 2011 Mitigation Projects**

This section describes mitigation activities performed during the reporting period. This section also includes a description of operation and maintenance activities associated with active mitigation systems.

#### **4.1.1 Sub-Slab Ventilation/Depressurization Systems**

During 2007, a sub-slab ventilation/depressurization system (SSVS) was installed in a portion of G Building. During 2009, SSVSs were installed in portions of B and D Buildings; A and C Buildings; and the former D-161 Area. The SSVS consisted of horizontal trenching to provide coverage of the targeted areas, and an equipment room to house filters and blower to clean and exhaust vapor to the outside. The G Building SSVS has been in operation since April 2008 and the B and D Buildings, A and C Buildings, Former D-161 Area SSVSs have been in operation since the third quarter of 2009.

Operation, maintenance, and monitoring activities continued in 2011. All four systems are routinely monitored to check for leaks and unusual noises and vibrations, verify proper operation of the relief valve, and to inspect the blower air filters. No issues were noted during these inspections and each SSVS has been operating satisfactorily with operating pressures and temperatures within acceptable ranges.

Pratt & Whitney also performed periodic indoor air sampling at locations throughout the campus. The purpose of this sampling has been to further evaluate how the presence of contaminants in environmental media beneath the building structures may be affecting indoor air, to guide future mitigation activities, and as an input to future corrective action remediation. In addition to mitigation efforts, the occupied facility building footprint was reduced in 2011 with the isolation of A Building from operations personnel. The dismantling of A Building is ongoing and is expected to be completed in 2012.



#### 4.1.2 G Building Basement Groundwater Treatment System

Groundwater from the G Building Basement Dewatering sump is treated through liquid phase granular activated carbon (GAC) prior to discharge to the sanitary sewer. The treatment system is monitored on a periodic basis in accordance with the terms and conditions of the individual State Pollutant Discharge Elimination System (SPDES) permit to ensure proper operating conditions (Permit # SP0000191, Discharge Serial Number [DSN] 028). The GAC is replaced on an as needed basis.

#### 4.1.3 G Building Tunnel Groundwater Treatment System

Groundwater from the G Building Tunnel Dewatering sump is treated through liquid phase GAC prior to discharge to the sanitary sewer. The treatment system is monitored in accordance with the terms and conditions of the individual SPDES permit to ensure proper operating conditions (Permit # SP0000191, DSN-029). The GAC is replaced on an as needed basis.

#### 4.1.4 C Building Basement Groundwater Treatment System

Groundwater from the C Building Basement Dewatering sump is treated through liquid phase GAC and ion exchange resin prior to discharge to the sanitary sewer. The treatment system is monitored on a periodic basis in accordance with the terms and conditions of the individual SPDES permit to ensure proper operating conditions (Permit # SP0000191, DSN-032). The GAC and ion exchange resin are replaced on an as needed basis.

#### 4.1.5 Engineering Area Tunnel Groundwater Treatment System

Groundwater from the Engineering Tunnel dewatering sumps is treated through an air stripper. The treatment system is inspected on a periodic basis to ensure proper operating conditions. The air stripper packing is periodically cleaned as necessary. The treatment system is monitored on a periodic basis in accordance with the terms and conditions of the individual SPDES permit to ensure proper operating conditions (Permit # SP0000191, DSN-021).

#### 4.1.6 K Building Basement Groundwater Treatment System

Groundwater from the K Building Basement Dewatering sumps is treated through an ion exchange system prior to discharge to the sanitary sewer. The treatment system is monitored on a periodic basis in accordance with the terms and conditions of the individual SPDES permit to ensure proper operating conditions. The ion exchange resin is replaced on an as needed basis (Permit # SP0000191, DSN-033).

## 4.2 2011 Remediation Projects

This section details soil, groundwater, surface water, or sediment remediation activities that were performed during the 2011 reporting period. This section also includes a description of operation and maintenance activities associated with active remediation systems.

### 4.2.1 Groundwater Hydraulic Control and Treatment System

The Groundwater Hydraulic Control and Treatment System was installed in 2009 to mitigate the migration of groundwater contaminated with hexavalent chromium beneath the northwest portion (in the vicinity of Office Building E and Willow Brook) of the Site. With the exception of planned maintenance shut-downs, the system operated continuously during 2011. The Groundwater Hydraulic Control and Treatment System consists of two subsystems: the hydraulic control system (HCS) and the groundwater treatment system (GWTS). The HCS consists of four, 8-inch diameter extraction wells with electric submersible pumps. The pumps are connected to a common underground header and the extracted water is transferred underground to the Main Facility and then in aboveground piping to the GWTS.

The Groundwater Hydraulic Control and Treatment System is operating in accordance with a Treatment System Modification Approval issued by the CTDEEP on February 24, 2009 to discharge pretreated wastewaters to the Colt Street Wastewater Treatment Plant (WWTP) under DSN 001-B. The pretreated groundwater is then treated with other industrial wastewaters and ultimately discharged to the Connecticut River as discharge DSN 001 in accordance with the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) permit number CT0001376.

As stated previously, the results of groundwater sampling and water level measurements collected as part of performance monitoring indicate that the Groundwater Hydraulic Control and Treatment System is effectively achieving the remediation goal of mitigating the migration of groundwater contaminated with hexavalent chromium beneath the northwest portion of the Site.

### 4.2.2 Steam Tunnel Product Recovery System

The operation of the Steam Tunnel Product Recovery System located within the former Photo Laboratory of B Building in the vicinity of the Underground Steam Tunnel continued in 2011. Product is recovered through low-flow submersible pumps installed in a network of recovery wells which pumps the product to a central collection tank. The system is monitored on a periodic basis and the product collection tank is emptied as necessary. To date, a total of 230

gallons of separate-phase petroleum product have been recovered and disposed of off the site. The system has been operational since December 6, 2008.

#### 4.2.3 Experimental Test and ETAL Significant Environmental Hazard Activities

##### *Experimental Test*

As discussed previously, several soil samples collected from the top two feet of soil during the performance of the Experimental Test Study Area Phase II/Phase III Subsurface Investigation contained tetrachloroethylene (PCE) at concentrations greater than thirty times the IDEC. On July 20, 2011, LEA completed the excavation of an approximately 15-foot by 12-foot area to a depth of 2 feet below grade (fbg) at sample location XT-SB-34. The excavation was extended to the location of soil borings previously advanced to delineate the extent of the observed significant environmental hazard condition. The excavated soils were placed into a rolloff container for offsite disposal in accordance with state and federal regulations.

Following the completion of excavation activities the excavation area was backfilled to existing grade with process material and restored with asphalt. With the completion of the excavation and offsite disposal activities, the significant environmental hazard identified in May 2011 was effectively abated prior to the 90-day reporting obligation pursuant to Section 22-6u of the Connecticut General Statutes.

##### *ETAL*

As discussed previously, several soil samples collected from the top two feet of soil during the performance of the ETAL Study Area Phase II/Phase III Subsurface Investigation contained benzo(a)pyrene at concentrations greater than thirty times the IDEC. On October 8, 2011, LEA completed the excavation of a 10-foot by 10-foot area to a depth of 2 feet below grade (fbg) at sample location ET-SB-170. The excavation was extended to the location of soil borings previously advanced to delineate the extent of the observed significant environmental hazard condition. The excavated soils were placed into a rolloff container for offsite disposal in accordance with state and federal regulations.

Following the completion of excavation activities the excavation area was backfilled to existing grade with clean fill material. With the completion of the excavation and offsite disposal activities, the significant environmental hazard identified in July 2011 was effectively abated prior to the 90-day reporting obligation pursuant to Section 22-6u of the Connecticut General Statutes.



Based on the results of the additional sampling activities within the Study Area, additional significant environmental hazard conditions pertaining to the detections of benzo(a)pyrene within the uppermost two-feet of soils at concentrations greater than thirty times the IDEC exist. A significant environmental hazard report for the additional significant environmental hazards was submitted to the CTDEEP on October 31, 2011. The notification letter to the CTDEEP indicated that the observed hazard condition is currently being mitigated through the presence and maintenance of an existing parking area and through the enforcement of security measures at the Site. Acknowledgement of the submitted notification, dated November 23, 2011, was received from the CTDEEP confirming the utilization of the noted mitigation measures until the completion of overall remedial measures in the future.

#### **4.3 Stadium Parking Parcels**

UTC/Pratt & Whitney has transferred property identified as the Stadium Parking Parcels which comprise a portion of the Site. The Stadium Parking Parcels consist of four parcels; the "Pickle Parcel", the "Notch Parcel", the "North Klondikes Parcel" and the "South Klondikes Parcel" which total approximately 65 acres in area. The Stadium Parking Parcels, located along the eastern portion of the Site, were transferred to the State of Connecticut for use as parking areas for the Rentschler Football Stadium. ECAFs were submitted to the CTDEEP in November 2009 for each of these parcels.

The overall remedial objective was to address the underlying soil within the Stadium Parking Parcels that have been impacted by VOCs, SVOCs, TPH, PCBs, and metals. The remedial approach consisted of the removal of soils with concentrations of constituents in excess of the IDEC and the GB Pollutant Mobility Criteria (GBPMC) of the RSRs. If material had contaminant concentrations greater than the numeric IDEC, reuse of this material within the Stadium Parking Parcels was undertaken to maintain or achieve inaccessibility. While historic remediation activities have been undertaken to satisfy the IDEC and the GBPMC, if impacted soil with contaminant concentrations in excess of these criteria were encountered during the stadium parking construction activities, it was managed in accordance with the RAPs prepared and submitted in May 2010 for each of the four Stadium Parking Parcels.

While the State of Connecticut Office of Policy and Management (OPM) was responsible for the stadium parking construction activities, UTC retained the responsibility for satisfying the remediation obligation for the Stadium Parking Parcels. For the successful completion of the work, the State of Connecticut and UTC worked together for the completion of the activities. The RAPs were prepared and submitted to the CTDEEP to document remediation activities and in preparation of the construction activities associated with the Stadium Parking Areas.

The State's construction activities began in April 2010 and were substantially complete in July 2011. In accordance with Section 22a-133k-2(h)(3) of the RSRs, a request for the approval of the Commissioner of the CTDEEP for the reuse of polluted soil for the Parcels was submitted by UTC and OPM to the CTDEEP. The request was approved by the CTDEEP. Overall, the stadium parking construction project required the handling of over 77,000 cubic yards of materials with approximately 30,000 cubic yards of materials imported from other locations. As part of the construction activities, approximately 10,000 cubic yards of materials meeting the definition of polluted soil was reused within the Project Area. A Remediation Report documenting the remediation activities for the Stadium Parking Parcels was submitted to the CTDEEP in November 2011.



## **5. 2011 MAINTENANCE AND MONITORING ACTIVITIES**

This section provides an overview of maintenance and monitoring activities associated with completed remediation projects that were performed during the reporting period.

### **5.1 Willow Brook and Willow Brook Pond/Willow Street North**

The post-remediation activities for this project include monitoring and maintenance of the engineered controls and groundwater monitoring to provide data relative to the effectiveness of the engineered control. These activities were initiated upon completion of the remediation activities in September 2002. In accordance with the *Post Remediation Groundwater Monitoring Plan* and the *Post Remediation Maintenance and Monitoring Program* for the Willow Street North project (approved by the CTDEEP on February 10, 2006) groundwater monitoring and maintenance of engineered controls for the Willow Brook and Willow Brook Pond project and the Willow Street North project were combined beginning in September 2006. In August 2010 CTDEEP granted approval to modify the Willow Brook and Willow Brook Pond groundwater monitoring program. The modifications to the monitoring program included a reduction in the monitoring frequency from quarterly to semi-annually and the discontinued sampling of four monitoring wells.

In accordance with the August 2010 CTDEEP approval, the 2011 annual report documenting the monitoring and maintenance of the engineered controls and groundwater monitoring associated with the Willow Street North and the Willow Brook and Willow Brook Pond projects is included as Appendix A of this report.

### **5.2 F Building and H Building**

The post-remediation activities for this project include monitoring and maintenance of the engineered controls and groundwater monitoring to provide data relative to the effectiveness of the engineered control. These activities were initiated in the first quarter of 2007 and will continue until such a time as the cessation of the activities is approved by the CTDEEP. In March 2010, a request was submitted to the CTDEEP for approval to modify the F Building and H Building groundwater monitoring program. The proposed modifications to the monitoring program included a reduction in the monitoring frequency from quarterly to semi-annually and the discontinued sampling of five monitoring wells. Based on correspondence between the CTDEEP and UTC between August 2010 and December 2011, the CTDEEP has requested that UTC submit a revised request for review and approval. UTC will submit the revised request during the first quarter of 2012 and will work with the CTDEEP to obtain approval of the request



prior to the next scheduled monitoring event in March 2012. A report documenting the 2011 monitoring and maintenance of the engineered controls and groundwater monitoring associated with the F Building and H Building remediation project is included as Appendix B of this report.



## 6. COST ESTIMATE

This section presents the cost estimate for planned corrective action activities at the facility. From a meeting with CTDEEP staff on February 24, 2006 and subsequent correspondence (dated June 29, 2006; July 25, 2006; and August 17, 2006) the cost estimate has been prepared as follows:

- Financial assurance will be provided for the cost of performing site-wide investigation, the implementation of RAPs that have been submitted to the CTDEEP for review, and the performance of long term operation, maintenance and monitoring associated with RAPs that have been implemented.
- Once a RAP has been implemented, the costs associated with that activity will be subtracted from future financial assurance cost estimates.

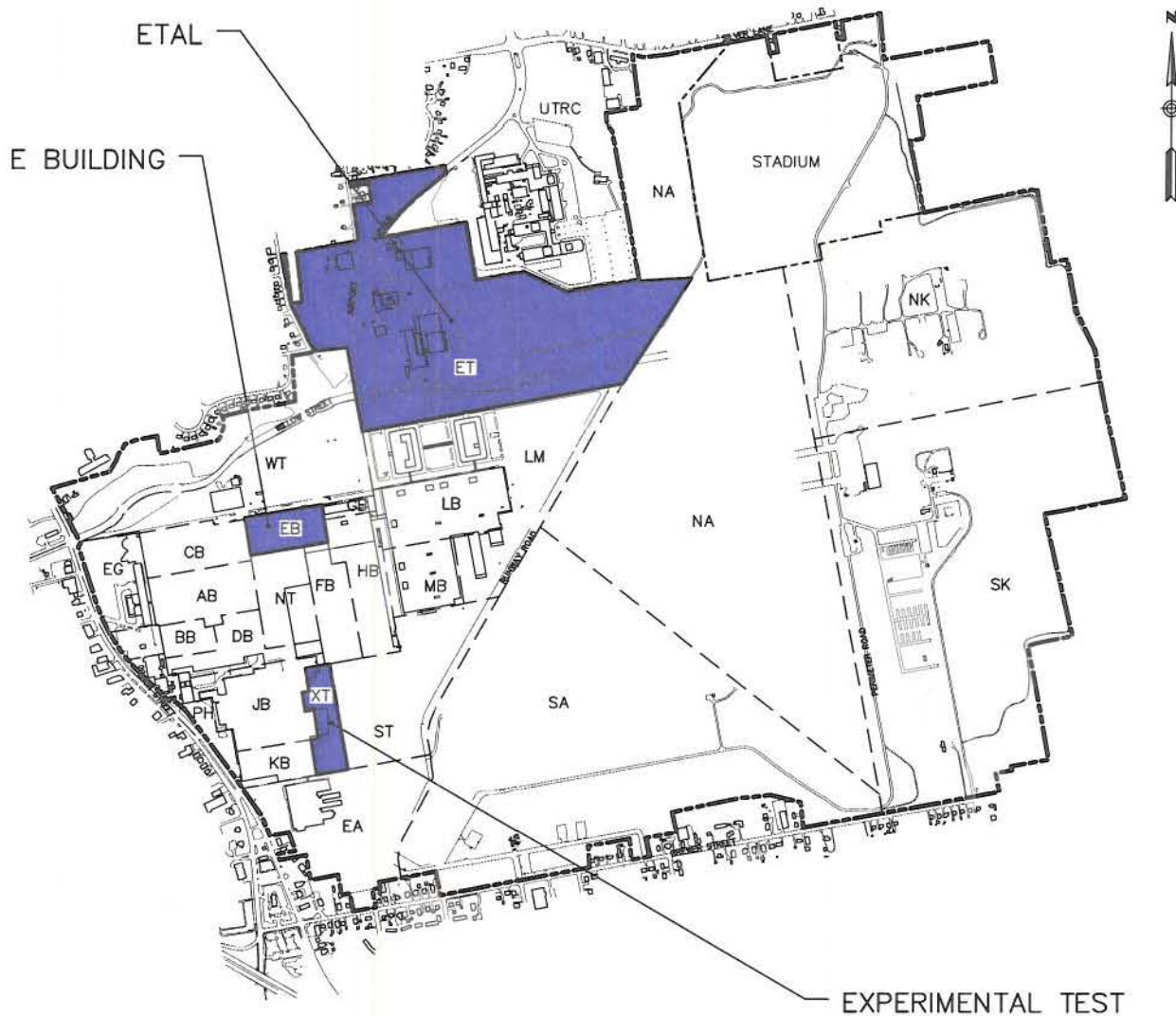
The cost estimate is provided in Appendix C. The current financial assurance estimate is \$5,768,200 which is \$443,900 less than the financial assurance estimate presented in January 2010. The changes in the financial assurance estimate in comparison to the estimate presented in January 2011 are as follows:

- A reduction of \$55,000 as the remaining portion of the E Building Study Area investigation activities were completed in 2011;
- A reduction of \$156,000 as the Experimental Test Study Area investigation was completed in 2011;
- A reduction of \$255,000 as the ETAL Study Area investigation was completed in 2011;
- A reduction of \$25,000 for operation and maintenance activities associated with B Building as the initial estimate was for the operation and maintenance of the Steam Tunnel Product Recovery System for a period of three years and the system has been in operation for two of the three years;
- An increase of \$22,500 for operation and maintenance activities associated with F Building to account for the fifth year of operation and maintenance of the Engineered Control in this area of the site bringing the total to five years required pursuant to Section 22a-133k-2(f)(2)(B)(vi) of the Regulations of Connecticut State Agencies; and

- A reduction of \$400 for operation and maintenance activities associated with G Building to account for the completion of the first year of inspections activities associated with the SSVS.
- A reduction of \$185,000 associated with the reduction of groundwater monitoring frequency (from quarterly to semi-annual) and well locations (reduction of four locations) for the Engineered Control for Willow Brook and Willow Brook Pond/Willow Street North.
- The financial assurance mechanism has been established and is currently in place.



## FIGURES



#### STUDY AREA DESIGNATIONS

Study Area Abbreviation	Study Area Name
EA	Engineering Area
EG	Executive Garage
ET	ETAL
LM	Area Outside L Building and M Building
NT	North Test
PH	Powerhouse
ST	South Test
WT	Waste Treatment
XT	Experimental Test
AB	A Building
BB	B Building
CB	C Building
DB	D Building
EB	E Building
FB	F Building
GB	G Building
HB	H Building
JB	J Building
KB	K Building
LB	L Building
MB	M Building
NA	North Airport
SA	South Airport
NK	North Klondike
SK	South Klondike

#### LEGEND



SCALE IN FEET

CORRECTIVE ACTION ANNUAL REPORT  
UTC/Pratt & Whitney Division, 400 Main Street, East Hartford, CT  
**Generalized Areas of Investigation**  
**– 2011 Reporting Period**

Comm.No.

88UT716

**FIGURE 3-1**



**Appendix A**

**2011 Annual Post Remediation Maintenance and Groundwater Monitoring Report  
Willow Brook and Willow Brook Pond  
East Hartford, Connecticut**

**(Volume 2 of 3)**

**Appendix B**

**2011 Annual Post Remediation Maintenance and Groundwater Monitoring Report  
F & H Buildings  
East Hartford, Connecticut**

**(Volume 3 of 3)**

## **Appendix C**

### **Cost Estimate for Corrective Action Activities**



**Financial Assurance Estimates**  
**DEP Permit HWM-043-061**  
*Pratt & Whitney East Hartford, CT*  
*January 2012*

	Investigation	RAP implementation for 2011	Current O&M	Subtotal
A Building	\$ -	\$ -	\$ -	\$ -
B Building	\$ 195,000	\$ -	\$ 25,000	\$ 220,000 <sup>1</sup>
C Building	\$ 321,000	\$ -	\$ -	\$ 321,000
D Building	\$ 336,000	\$ -	\$ -	\$ 336,000
E Building	\$ -	\$ -	\$ -	\$ -
F Building	\$ -	\$ -	\$ 112,500	\$ 112,500 <sup>2</sup>
G Building	\$ -	\$ -	\$ 93,300	\$ 93,300 <sup>3</sup>
H Building	\$ -	\$ -	see F bldg	\$ -
J Building	\$ 372,000	\$ -	\$ -	\$ 372,000
K Building	\$ 183,000	\$ -	\$ -	\$ 183,000
L Building	\$ 186,000	\$ -	\$ -	\$ 186,000
M Building	\$ 273,000	\$ -	\$ -	\$ 273,000
L&M Area	\$ -	\$ -	\$ -	\$ -
South Production Test	\$ -	\$ -	\$ -	\$ -
North Test Area	\$ 325,000	\$ -	\$ -	\$ 325,000
Power House	\$ 252,000	\$ -	\$ -	\$ 252,000
Experimental Test (including South Experimental Test)	\$ -	\$ -	\$ -	\$ -
Waste Treatment	\$ 300,000		\$ 980,000	\$ 1,280,000 <sup>4</sup>
Engineering Area	\$ -	\$ -	\$ -	\$ -
Executive Garage	\$ 69,000	\$ -	\$ -	\$ 69,000
Experimental Testing Airport Laboratory (ETAL)	\$ -	\$ -	\$ -	\$ -
Groundwater	\$ 250,000	\$ -	\$ 1,445,400	\$ 1,695,400 <sup>5</sup>
Ecological Risk	\$ 50,000	\$ -	\$ -	\$ 50,000
<b>Total</b>	<b>\$ 3,112,000</b>	<b>\$ -</b>	<b>\$ 2,656,200</b>	<b>\$ 5,768,200</b>

Notes:

<sup>1</sup> Obligation associated with LNAPL recovery system project

<sup>2</sup> Long-term obligations associated with F&H Bldg remediation project

<sup>3</sup> Long-term obligations associated with G-building remediation project

<sup>4</sup> Long-term obligations associated with Willow Brook, Willow Pond and Willow Street remediation projects and hexavalent chromium hydraulic control

<sup>5</sup> Operation and maintenance of groundwater treatment systems in basements and tunnels